

# Wolf looking forward to January space walk using Russian suit

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He said he would make the trip again "in a minute."

All systems were functioning normally aboard Mir after an interruption in Mir's Motion Control System computer that caused a temporary loss of automatic attitude control on Nov. 21. Russian flight controllers traced the problem to a failure of the three channels that supply data to Mir's electronically operated gyroscopes. While the problem was being fixed, Mir's crew powered down all non-essential systems.

Mir 24 Commander Anatoly Solovyev and Flight Engineer Pavel Vinogradov exchanged the faulty computer with a unit that was brought up on the last Progress resupply vehicle, which was launched Oct. 5.

Since the Mir's batteries did not drain before the gyroscopes spun down following the computer glitch, the crew was able to replace and reinitialize the MCS computer and spin up the gyroscopes almost immediately.

U.S. and Russian officials have agreed that the next two space walks aboard the Mir Station will be tentatively scheduled for Jan. 5 and 9.

In a public letter home, Wolf said he's looking forward to a possible opportunity to accompany Solovyev on one of those space walks. The first will install a new seal to the leaking Kvant-2 exterior airlock hatch and secure the damaged solar array on the Spektr module.

The second is designed to retrieve a U.S. experiment, the Optical Properties Monitor, that was deployed during astronaut Jerry Linenger's space walk on April 29. OPM has examined the degradation of different materials when they are exposed to the space environment. The materials are being tested for possible use on the International Space Station. The Optical Properties Monitor is scheduled to return on the next shuttle mission to Mir, STS-89, scheduled in mid-January.

Wolf has been helping his crew mates with system activities aboard Mir, as well as continuing his science program. He began an investigation that measures bone

loss during long-term space flight.

Previous studies have shown that long duration exposure to the microgravity environment causes a gradual loss in total bone mineral. This condition mimics osteoporosis, a medical condition characterized by brittle bones. By learning more about the process of bone mineral loss and recovery, researchers hope to be able to develop more effective treatments for those who suffer from bone disorders on Earth.

Wolf is beginning the tenth week of his four-month mission which will end in January when he is replaced by U.S. Astronaut Andy Thomas, who will be launched aboard *Endeavour* on STS-89. Wolf will return to Earth as part of the STS-89 crew.



## France's Tognini on STS-93

Veteran French Space Agency astronaut Michel Tognini will fly aboard Space Shuttle Columbia as a member of the STS-93 crew, slated for an August 1998 launch.

A member of NASA's 1995 astronaut class, Tognini was one of seven astronauts selected by CNES in 1985. The French Air Force



Tognini

colonel trained extensively at the Gagarin Cosmonaut Training Center in Star City, Russia, in support of joint Soviet-French space missions. In 1992, he spent 14 days aboard the Mir space station with crew mates Anatoly Solovyev and Sergei Avdeiev. STS-93 will mark Tognini's first flight on the space shuttle.

During the five-day mission, Tognini and his crew mates will deploy the Advanced X-ray Astrophysics Facility Imaging System, which will conduct comprehensive studies of the universe. AXAF consists of three major elements: a spacecraft with an inertial upper stage rocket motor, a telescope, and a science instrument module. Its principal objectives are to study X-ray emissions of stars and planets and to resolve images of extended supernova remnants.

The remaining STS-93 crew members will be named later.

## Readdy to discuss shuttle upgrades

Astronaut Bill Readdy, manager of Space Shuttle Program Development, will discuss the space shuttle upgrade program at 5:30 p.m. Tuesday, Dec. 9, at the Gilruth Center.

The discussion is being hosted by the American Institute of Aeronautics and Astronautics Houston Section. Cost is \$5 for members, \$10 for non-members and \$3 for students.



Photo courtesy Lockheed Martin

The first super lightweight tank for the space shuttle is stacked in Cell A of the Vertical Assembly Bldg. at the NASA Michoud Assembly Facility in New Orleans.

## First super lightweight tank achieves major milestone

The first super lightweight tank for the space shuttle achieved a major production milestone as mating of major components was completed by Lockheed Martin Michoud Space Systems personnel in late October.

The liquid oxygen tank/intertank and liquid hydrogen tank were stacked in the Vertical Assembly Bldg. at the NASA Michoud Assembly Facility in New Orleans. The SLWT is in final assembly at Michoud for completion of mechanical, electrical and thermal protection system installation, and final acceptance tests.

The tank is on schedule for delivery to NASA in January in support of the May launch of STS-91, the final scheduled shuttle-Mir docking mission.

The tank, designed and assembled by Lockheed Martin Michoud Space Systems, is a redesigned external tank, using aluminum-lithium allows and other design enhancements to reduce overall weight by 7,500 pounds. The weight savings will result in increased shuttle payload capacity.

Increased performance is critical for deployment of International Space Station elements.

## STS-87 astronauts move on to science

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launch of the first component next summer.

The space walk lasted 7 hours, 43 minutes, but the astronauts were not able to complete all of its objectives, so early this week mission managers were discussing the possibility of a second space walk by Scott and Doi.

A second deployment of the Spartan satellite was nixed this past Sunday when propellant margins on the shuttle were deemed insufficient to protect all of the options associated with a safe rendezvous and capture of Spartan again.

"It just wasn't enough," said Lee Briscoe, who added that scientists believe the spacecraft is healthy and can be brought home and reflown on another, as yet undefined, shuttle flight.

"All indications are we have a healthy spacecraft," said Craig Tooley, Spartan project manager. "We are still not sure what caused this. It was basically idling, and it never got out of the idle mode."

In and around the activity with Spartan, data was gathered around the clock by a number of investigations in support of STS-87's primary experiment package, the United States Microgravity Payload, flying for the fourth time on the shuttle.

The USMP-4 experiment package mounted in the rear of *Columbia's* payload bay requires little or no interaction by the crew, but another set of "hands-on" experiments in the microgravity glovebox facility in the mid-deck required near constant involvement by crew members.

Five instruments on the support structure near the orbiter's tail include a furnace to study semiconductor material solidification; a crystal growing facility using a materials processing furnace; an experiment to study thermal properties of materials; an investigation into the theories and assumptions concerning the solidification process of metal products; and a study measuring the effects of vibrations on the support structure for the sensitive experiments.

Already scientists have reported measuring the fastest growth rate

ever for a tiny tree-like crystalline, called a dendrite, using an acid that serves as a stand in for metals such as aluminum and copper. This acid allows investigators to see into the solution and observe the growing dendrites. The experiment may help in improving the quality of metals and their performance.

The glovebox serves as a mini laboratory for the study of combustion science, composite component strength, and uniform mixing of different metal alloys during the melting and solidification process.

Operations in the Advanced Automated Directional Solidification Furnace ended earlier than planned Sunday afternoon when the science team noted unexpected readings from several temperature sensors.

"Prior to this mission the furnace was modified to allow the exchange of samples aboard the shuttle," said Assistant Mission Manager Jimmie Johnson. "Although we

were unable to complete the third experiment run, the two we have completed will potentially yield more science from this mission than the previous two missions combined."

The furnace, with its precise temperature control, is used to gradually grow large, near-perfect lead-tin-telluride crystals—semiconductor materials that determine the speed and amount of information stored and sent by computers and electronics.

If landing occurs on schedule, the STS-87 crew will brief employees at 7 p.m. Dec. 17 in the IMAX Theater at Space Center Houston. JSC Director George Abbey will present the crew's Space Flight Medals, and other awards to individuals and teams who made key contributions to the flight. The program will conclude with the IMAX movie "The Dream is Alive." Limited seating will be available. The program is open to JSC employees, family members, friends, contractors both on and off site, and guests. Doors open at 6:30 p.m. and seating is first-come, first-served. Admission and parking at Space Center Houston are free.



## Life support chamber crew counts blessings

Thanksgiving is a time for reflection and counting your blessings, and the Lunar Mars Life Support Test Project Phase III crew was no exception.

"As we approach the end of this test, we have many, many things to be thankful for," said Commander Nigel Packham. "First, the test has been extremely successful, and we have learned so much from these short three months, both about life support systems and the humans they keep alive. The life support systems are working so well that 1998 will be spent evaluating flight versions of these systems for possible inclusion as space station baseline hardware. We are thankful for this accomplishment. Packham said the crew is thankful

for family and friends that have given tremendous support; technicians who put together the testbed; engineers who designed, maintained and kept the systems singing throughout the test; scientists who dreamed of dancing molecules and gave them life; test directors who kept them informed, safe and comfortable; crew support personnel who were the legs and voice of the crew outside of "this steel beast"; chamber operators who delivered everything they needed to keep going; experimenters who put together the science package; and for the data collected.

"We are thankful for the tremendous support we have received from all levels of management, NASA and contractor," Packham added. "We are thankful that 52 of our friends and col-

leagues have been launched into space on eight shuttle missions this year, and that four of them have traveled to and/or from Mir to investigate how long-duration stays in microgravity affect them. Finally, we are thankful that the dream of setting foot upon another planet is alive and kicking."

With the end of the test set for Dec. 19, there are still many goals to be accomplished. The team was to speak with about 6,500 students of various grade levels in Iowa via three video link-ups this past week, spreading the word about the benefits of NASA programs and the importance of a good education. An on-orbit link-up with the STS-87 crew and JSC Director George Abbey and U.S. Rep Nick Lampson, D-Texas, also was planned.



JSC Photo by Nigel Packham

Lunar Mars Life Support Test Project Phase III test subjects, from left, Vickie Kloeris, a JSC shuttle food system manager; John Lewis, a Lockheed-Martin life support system engineer; and Laura Supra, an AlliedSignal life support system engineer, enjoy Thanksgiving dinner "inside the tank."